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WHAT IS CLAIMED IS :

1. A method of fabricating semiconductor devices, using a semiconductor processing system having at least one light processing apparatus and at least one vacuum processing apparatus, said method comprising:
  - processing a substrate by one of said at least one vacuum processing apparatus;
  - transporting said substrate from said one of said at least one vacuum processing apparatus into one of said at least one light processing apparatus without exposing said substrate to outside air; and
  - processing said substrate by a light in said one of said at least one light processing apparatus.
2. The method of claim 1 wherein said at least one vacuum processing apparatus is any one or more of a film formation apparatus, an etching apparatus, a doping apparatus, and a thermal processing apparatus.
3. The method of claim 1 wherein said light is a laser light or an infrared light.
4. The method of claim 1 wherein said at least one vacuum processing apparatus is a plasma CVD apparatus, a sputtering apparatus, a thermal CVD apparatus, a vacuum evaporation apparatus, a plasma doping apparatus, an ion implantation apparatus, a thermal diffusion apparatus or a thermal crystallization apparatus.
5. The method of claim 1 wherein said at least one light processing apparatus is a laser etching apparatus, a laser annealing apparatus or a laser doping apparatus.
6. The method of claim 1 wherein the transportation of said substrate from said one of said at least one vacuum processing apparatus into said one of said at least one light processing apparatus is carried out through a preliminary chamber provided

therebetween.

7. The method of claim 1 wherein said light is irradiated to said substrate with said substrate being moved relative to said light.

8. An apparatus for processing a semiconductor provided on a substrate comprising:

an irradiation apparatus for irradiating a light to said semiconductor therein;  
a vacuum apparatus for a vacuum processing; and  
a mechanism for transporting said substrate from said vacuum apparatus to said irradiation apparatus without exposing said substrate to outside air.

9. The apparatus of claim 8 wherein said irradiation apparatus is a laser etching apparatus, a laser annealing apparatus or a laser doping apparatus.

10. The apparatus of claim 8 wherein said light is a laser light or an infrared light.

11. The apparatus of claim 8 wherein said vacuum apparatus is a plasma CVD apparatus, a sputtering apparatus, a thermal CVD apparatus, a vacuum evaporation apparatus, a plasma doping apparatus, an ion implantation apparatus, a thermal diffusion apparatus, a thermal crystallization apparatus or an etching apparatus.

12. The apparatus of claim 8 further comprising a laser for emitting a laser light wherein the emitted laser light is introduced into said irradiation apparatus through a window provided in a wall of said irradiation apparatus.

13. The apparatus of claim 8 wherein said irradiation apparatus comprises a holder for holding said substrate therein, and said holder can be moved relative to said light.

14. The apparatus of claim 8 further comprising a preliminary chamber between said irradiation apparatus and said vacuum apparatus wherein the transportation of said substrate from said vacuum apparatus to said irradiation apparatus is carried out through said preliminary chamber.

15. The apparatus of claim 14 wherein said vacuum apparatus, said irradiation apparatus and said preliminary chamber can be evacuated.

16. An apparatus for processing a semiconductor provided on a substrate comprising:

- a preliminary chamber;
- a light processing apparatus connected with said preliminary chamber;
- an ion introducing apparatus connected with said preliminary chamber; and
- an etching apparatus connected with said preliminary chamber.

17. The apparatus of claim 16 wherein said light processing apparatus is a laser processing apparatus.

18. The apparatus of claim 16 wherein said ion introducing apparatus is a plasma doping apparatus.

19. The apparatus of claim 16 further comprising a chamber, connected with said preliminary chamber, for introduction and takeout of said substrate.

20. The apparatus of claim 16 further comprising a magic hand for transporting said substrate into said preliminary chamber, said light processing apparatus, said ion introducing apparatus, and said etching apparatus.

21. An apparatus for processing a semiconductor device

Pub. B2 Cond. comprising at least a light processing chamber for treating a surface with light therein and an evacuable chamber for performing a vacuum treatment therein, wherein said apparatus is provided with a means for transferring an object from said light processing chamber to said evacuable chamber, or vice versa without exposing said object to air.

22. The apparatus of claim 21 wherein said light is a laser light or an infrared light.

23. The apparatus of claim 21 wherein said evacuable chamber is selected from the group consisting of a film formation chamber, an etching chamber, and a heat-treatment chamber.

24. A method for processing a semiconductor device comprising the steps of:

performing a first treatment on an object in a first chamber;

transferring said object from said first chamber to a second chamber without exposing said object to air; and

performing a second treatment on said object in said second chamber,

wherein at least one of said first treatment and said second treatment comprises the step of treating said object with light.

25. The method of claim 24 wherein said light is a laser light or an infrared light.

26. The method of claim 24 wherein the other one of said first treatment and said second treatment is selected from the group consisting of a film formation, an etching and a heat-treatment.

27. An apparatus for processing a semiconductor device comprising:

a first chamber for treating an object with light therein;

a second chamber for treating said object; and

a transferring means for transferring said object from said first chamber to said second chamber without exposing said object to

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28. The apparatus of claim 27 wherein said light is a laser light or an infrared light.

29. The apparatus of claim 27 wherein said second chamber is selected from the group consisting of a film formation chamber, an etching chamber, and a heat-treatment chamber.

30. A method for processing a semiconductor device comprising the steps of:  
treating an object with light in a first chamber;  
transferring said object after said treating from said first chamber to a second chamber; and  
processing said object in said second chamber.

31. The method of claim 30 wherein said light is a laser light or an infrared light.

32. The method of claim 30 wherein said processing comprises at least one step selected from the group consisting of a film forming step, an etching step and a heat-treating step.

33. A method of fabricating a semiconductor device, using a semiconductor processing system having at least one light processing apparatus and at least one vacuum processing apparatus, said method comprising:

irradiating a light to a semiconductor film provided on a substrate under an oxidizing or nitriding atmosphere in said one light processing apparatus;

transferring said substrate from said one light processing apparatus to said one vacuum processing apparatus without exposing said substrate to air; and

forming a film comprising a material selected from the group consisting of silicon oxide and silicon nitride on said semiconductor film after said transferring.

34. The method of claim 33 wherein said one vacuum processing apparatus is a plasma chemical vapor deposition apparatus, a low pressure chemical vapor deposition apparatus, an atmospheric

pressure chemical vapor deposition apparatus or a sputtering apparatus.

35. An apparatus for fabricating a semiconductor device comprising:

- at least one light processing apparatus;
- at least one vacuum processing apparatus; and
- at least one vacuum film formation apparatus,

wherein said one light processing apparatus comprises means for supplying a light in an oxidizing or nitriding atmosphere in said one light processing apparatus.

36. The apparatus of claim 35 wherein said one vacuum processing apparatus is an etching apparatus, a doping apparatus or a thermal processing apparatus.

37. A method of fabricating a semiconductor device comprising the steps of:

forming a film comprising a material selected from the group consisting of silicon oxide and silicon nitride on a surface of a non-single crystal silicon film by irradiating a light to said non-single crystal silicon film under an oxidizing or nitriding atmosphere; and

forming an insulating film on said film comprising a material selected from the group consisting of silicon oxide and silicon nitride,

wherein said non-single crystal silicon film is crystallized by the irradiation of said light.

38. The method of claim 37 wherein said light comprises a light pulse having a pulse width of 1μsecond or shorter.

39. A method of fabricating a semiconductor device comprising the steps of:

crystallizing a non-single crystal silicon film by irradiating a light to said non-single crystal silicon film under an oxidizing or nitriding atmosphere;

forming a film comprising a material selected from the group consisting of silicon oxide and silicon nitride on said silicon film by vapor phase growth;

subjecting said non-single crystal silicon film to heating treatment under an atmosphere comprising hydrogen;

forming a silicon oxide film on said silicon film after said heating treatment.

40. A method of fabricating a semiconductor device, using a semiconductor processing system having a first chamber for a light processing, a second chamber for heat treatment under an atmosphere comprising hydrogen, a third chamber for forming a film, and a common chamber connected with said first, second and third chambers, said method comprising:

irradiating a light to a non-single crystal silicon film under an oxidizing or nitriding atmosphere in said first chamber to crystallize said non-single crystal silicon film and to oxidize or nitride a surface of said non-single crystal silicon film;

subjecting said silicon film to heating treatment under an atmosphere comprising hydrogen in said second chamber; and

forming a film comprising a material selected from the group consisting of silicon oxide and silicon nitride over said silicon film in said third chamber.

wherein said silicon film can be transferred from one of said first, second and third chambers to another of said first, second and third chambers through said common chamber without exposing said silicon film to air.

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